

# INTEGRATED WATERSHED MANAGEMENT FOR SUSTAINABLE DEVELOPMENT

Author - Kapileswar Mishra,  
National Doctoral Fellow,  
Department Of Civil Engineering,  
Indian Institute of Technology,  
KHARAGPUR, WB, INDIA.

## ABSTRACT

Land, water and people are the basic resources of a nation. Productive land is the source of human sustenance and security. The gross mismanagement of the land and water resources has resulted in increased recurrence of natural calamities like droughts, floods, earthquake, landslides etc. Water is essential for human survival, yet floods are responsible for increasing loss of life and destruction of crops and property every year. Droughts are caused by absence of water and floods by an excess of it. Nevertheless, one often follows the other, since the same process usually causes them: excessive environmental degradation in catchment areas. The integrated watershed management using the appropriate technology is the need of the hour for sustainable development.

## WATERSHED

Watershed is a geohydrological unit draining at a common point by a system of streams. In other words, watershed is defined as a drainage area whose run off flows past one point. It is an entity from which water flows into a stream, lake or other point of drainage. Watershed may also be defined as the geographic area of overland (surface) drainage that contributes water to the flow of a particular stream at a chosen point. Therefore, watershed is a water collecting and water-handling unit.

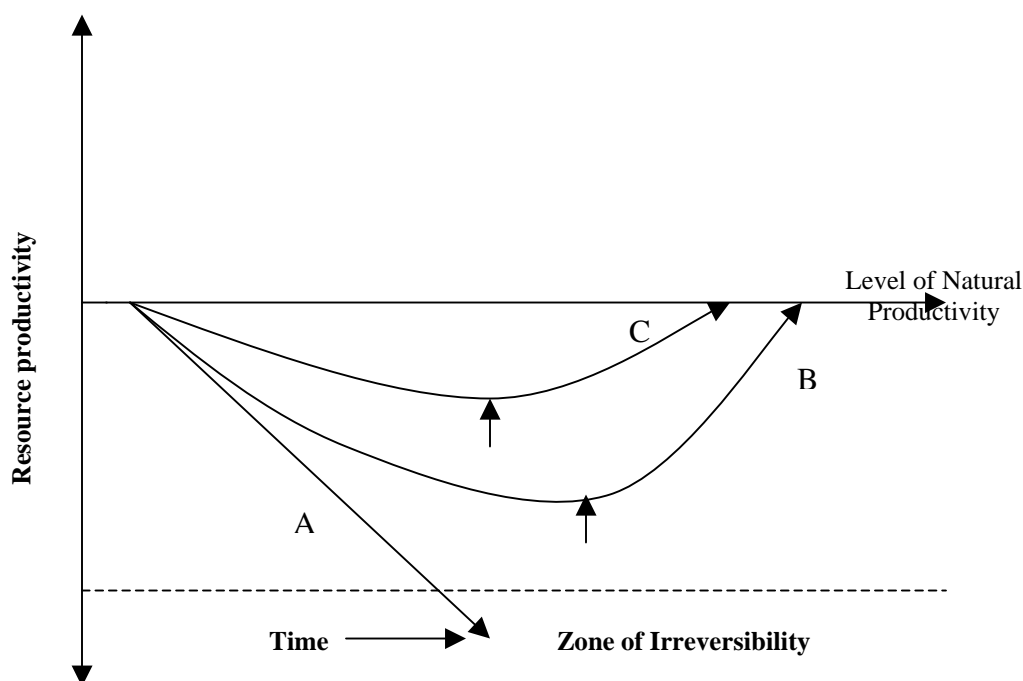
Generally, the term river basin is used for large watersheds that form drainage of river. The term watershed is generally used by planners and engineers to define a planning or a manageable area of operation. The prefixes like Sub, Mini, and Micro-etc can be used to denote smaller drainage units within a larger watershed. Watershed management is an approach to build and strengthen the basic resources found in this area i.e. a watershed, so as to enable the sustainable life support system.

## SUSTAINABLE DEVELOPMENT

Sustainable development is a development that meets the need of the present without compromising the ability of future generation to meet their own needs. The process of sustainability is shown in Fig-1. The focus in sustainable development is to include:-

- i) Self-reliant development within the constraints of natural resources.
- ii) Use of appropriate technologies.
- iii) Extended meaning of cost effective development.
- iv) Health
- v) Food self-reliance, clean water and shelter for all.

**Fig-1. The process of sustainability**



1. Society A is undergoing a process of unsustainable development.
2. Society C is more capable of making sustainable use of its natural resources than society B. The latter learning period is longer.
3. Arrows show the point when the society begins to learn from its mistakes and change its behavior accordingly.

## NEED

Since the commencement of Five Year Plans in 1951, vast resources were invested for developmental activities. The assessments on impact of the plans indicate that the results are not commensurate with the stupendous inputs. Further, the scientific influence on the common man is negligible in spite of heavy investments made in Scientific Departments National Laboratories and Communication Media. The response is in visible due to failure of the systems, lack of integrated approach and aversion of the common man for accepting something new.

According to the Technical Committee on D.P.A.P & D.D.P.(1984) headed by Dr. C.H. Hanumantha Rao “ The degradation of environment in dry land areas is basically attributable to the increasing biotic pressure on the fragile eco-systems in absence of adequate investments and appropriate management practices to augment and conserve the land and water resources. Population growth and poverty on one hand and pressure of rising demand from affluence on the other have been exerting powerful pressure on the eco-systems. The macroeconomic policies which provide inducement to the over exploitation, are also responsible for denudation of environment. For example, in dry land areas, the pumping of water has been proceeding at a faster rate than the rate at which ground water being recharged”

The International Environmental Technology Center in collaboration with UNEP (United Nations Environmental Programme) also have recommended various agricultural technology, water conservation measures and other quality improvement measures to improve the status of rural areas and the habitat for sustainable development.

There is now consensus that there should be a balance between “Production Ecosystem” that maximizes food and other requirement of human beings with the “Protective Ecosystem” to maintain diversity of nature.

Deliberation at the highest levels of Government from time to time for better developmental programmes led to reorganization of the plan systems. In consequence, watershed concepts are revived and relevant Government policies are reoriented to disseminate the approach into the rural system, some of the consequential programmes of importance are launched by Wasteland Development Board (WLDB), and Council for Advancement of People Action & Rural Technology (CAPART), in addition to the Ministries of Environment and Forestry, agriculture, Water resources and Power and Department of Science & Technology for delivering the concept to the four corners of the country.

## **APPROPRIATE TECHNOLOGY**

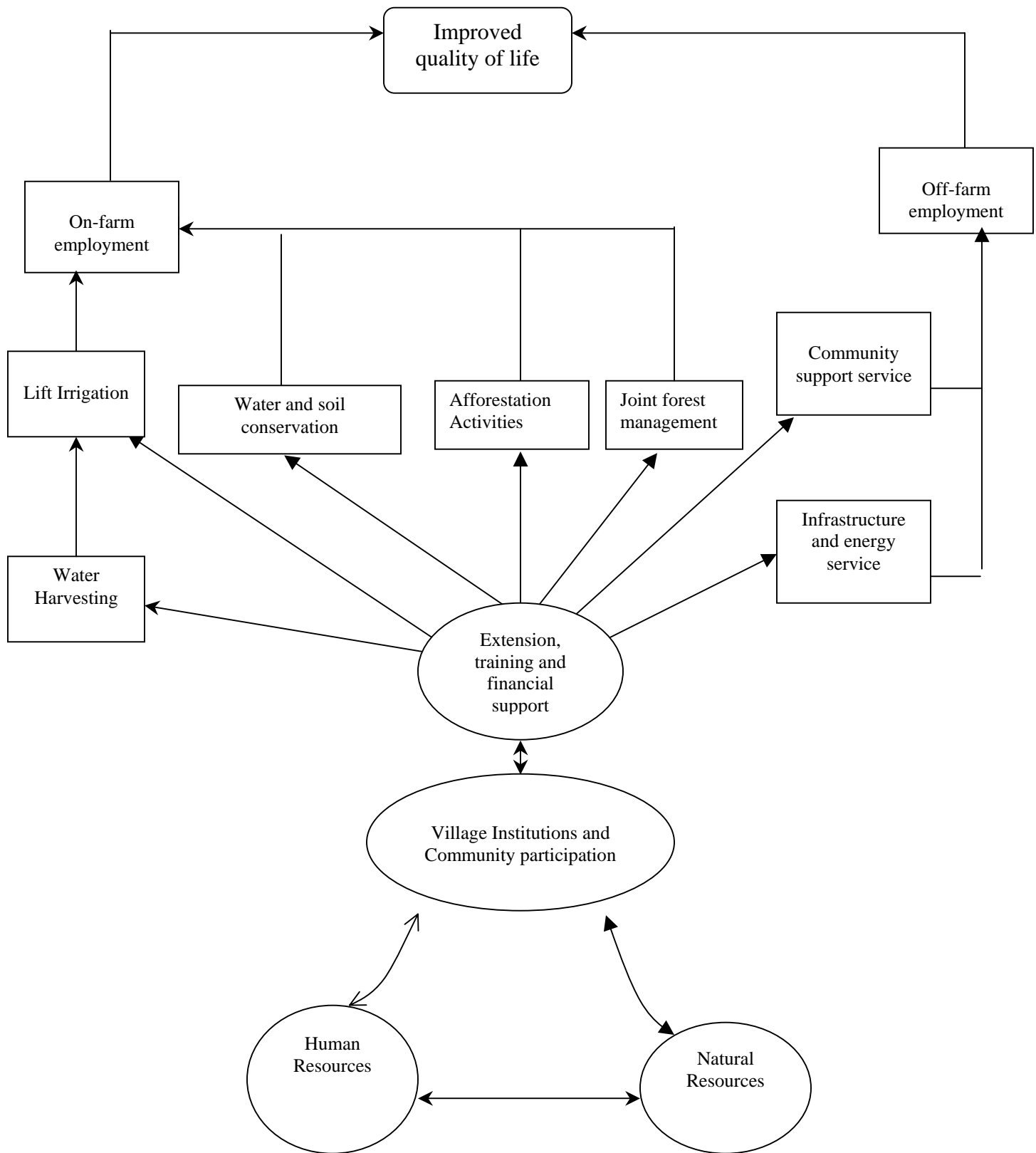
Appropriate Technology (AT) is defined as that which suits the environment in which it is used. Appropriate Technology is a chosen means to sustainable society. Prominent features of AT are:

- Low in capital costs
- Using local materials
- Employing local labour & skills
- Small in scale
- Manageable by villagers
- Collective efforts for improving their community
- Involves decentralized renewable energy sources
- Understandable to participants for suggesting innovations
- Flexible for adapting to local conditions
- Easily accessible with know-how

## **INTEGRATED WATERSHED MANAGEMENT APPROACH**

Integrated Watershed management Approach (IWMA) is “the process of utilization, development and conservation of land, water, forest and other resources for continually improving livelihoods for communities in a hydro logically independent region”. It includes everything in a watershed required for a holistic human development and natural resources management. Fig. 2 shows a schematic chart of typical elements of IWMA. Management’s tool like Satellite Remote Sensing (RS), Geographic Information System (GIS) Numerical Modelling, and Management Information Systems (MIS) can aid policy makers and planners to take effective decisions to ensure a stable management of water for food and the environment.

**Fig-2. Typical schematic chart of a sustainable integrated watershed management approach**



## **COMMUNITY PARTICIPATION, CAPACITY BUILDING AND EMPOWERMENT OF PEOPLE**

People in the watershed should be involved in developmental activities at all stages of the project; conception, planning, financing and maintenance. Village volunteers identified by the community can catalyze the entire effort by acting as information sources, service providers, and trainers. They can also provide help in monitoring and act as a link between the project implementing agency and the community. The local institutions such as Panchayati Raj or cooperatives should be empowered, and village functionaries and farmers involved in agricultural extension through creating awareness, imparting skills and sharing knowledge. Special efforts should also be made for ensuring women's participation and empowerment in project activities, as they typically perform 50-60% work in their farm with the men folk.

## **PROGRAMME IN WATERSHED MANAGEMENT**

The programmes that can be taken in a watershed may be broadly categorized in to three groups.

1. Resource- Regeneration Programmes.
2. Resource-Conservation Programmes.
3. Welfare Programmes.

### **1. Resource- Regeneration Programmes**

- a) Rainwater Harvesting and developing of surface water resources through a series of storage structures like earthen bunds and check dams.
- b) Afforestation to meet basic food, fodder, firewood and fiber requirements of the community.
- c) Dry land farming and capability based land use development and adoption of improved appropriate techniques.

### **2. Resource-Conservation Programmes**

- a) Soil conservation through gully plugging, contour bunding, trenching, contour tilling and through vegetative methods.
- b) Water management by technically efficient water and land use system.
- c) Development of alternate sources of energy like biogas, efficient wood stoves, wind powered and solar powered devices.

### **3. Welfare Programmes**

- a) Rural sanitation, community health, hygiene and provision of potable water.
- b) Community organization, extension education, vocational training and informal education.

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